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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/596,241	06/06/2006	Shengzhong Zhang	US030488US	3990

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EXAMINER
KIKNADZE, IRAKLI

ART UNIT	PAPER NUMBER
2882	

MAIL DATE	DELIVERY MODE
05/01/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/596,241	ZHANG ET AL.	
	Examiner	Art Unit	
	Irakli Kiknadze	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 June 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____. .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/6/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 20 is objected to because of the following informalities:

Claim 20 should end with a period symbol.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claim 1, 3-5, 9-16 and 18-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Kendall (US Patent 5,956,383).

With respect to claims 1 and 19, Kendall teaches a cooling system for use with an associated x-ray tube assembly (Figs. 2, 3 and 5) comprising:

a heat exchanger (32) which receives cooling fluid from a housing of the associated x-ray tube assembly and transfers heat between the cooling fluid and a flow of air (Figs. 2 and 3; column 3, lines 50-60);

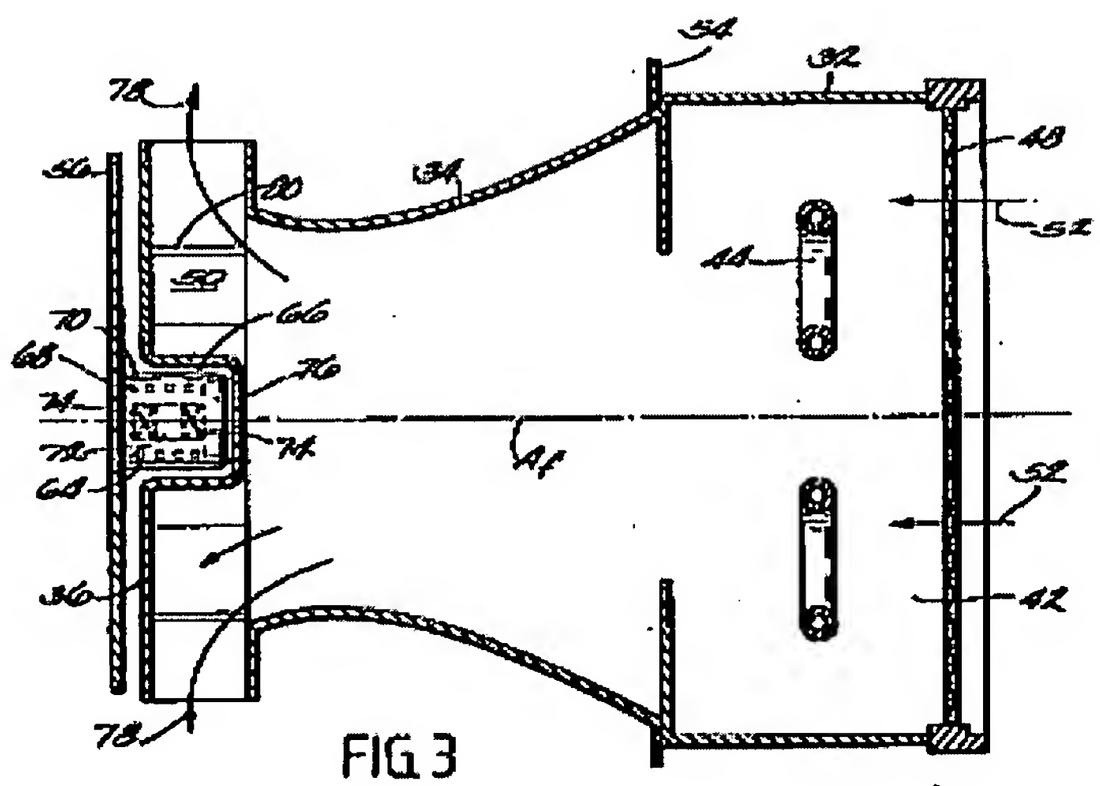


FIG 3

a fan (36) disposed to move the flow of air through the heat exchanger; and an air flux director (34) positioned to intercept the flow of air from the heat exchanger (32) and to redirect the flow of air in a direction which is generally perpendicular to an axis of rotation of the fan (Af) (Fig.3; column 4; lines 54-59).

With respect to claim 20, Kendall teaches a method for cooling an x-ray tube assembly comprising: receiving a heated cooling liquid from the x-ray tube assembly through a fluid flow path; transferring heat between the cooling liquid (column 3; lines 50-60) and a flow of air generated by a fan (36), the fan exhausting the air flow in a direction generally parallel with its axis of rotation (column 4; lines 3-13); deflecting the exhausted air in a radial direction which is generally perpendicular with the axial direction (column 4; lines 54-59).

With respect to claim 3, Kendall teaches that the air flux director defines a substantially truncated cone with a concave outer surface (Fig. 3).

With respect to claim 4, Kendall teaches that the air flux director is spaced from the fan along the rotational axis of the fan (Fig.3).

With respect to claim 5, Kendall teaches that the air flux director is aligned with the rotational axis of the fan (Fig. 3).

With respect to claim 9, Kendall teaches a duct which receives air from the heat exchanger (32) and diminishes in cross section toward the air flux director (34) (Fig.3).

With respect to claim 10, Kendall teaches that the fan (36) includes radial blades that are positioned within the duct (34) (Fig.3).

With respect to claim 11, Kendall teaches that the air flux director defines a truncated cone with a concave outer surface, the duct, the fan blades, and the air flux director being coaxial (Fig. 3).

With respect to claim 12, Kendall teaches a second heat exchanger (32b) mounted in parallel with the first heat exchanger (32a); a second fan (36b) disposed to move a second flow of air through the second heat exchanger (32b); and
a second air flux director (34b) positioned to intercept the second flow of air from the second heat exchanger (32b) and redirect the second flow of air in a direction which is generally perpendicular to an axis of rotation of the second fan (36b) (Fig. 5).

With respect to claim 13, Kendall teaches that at least a first air flux separator (56a and 56b), positioned intermediate the first (34a) and second air flux directors (34b), to reduce turbulence created by intermixing of the first and second flows of air (Fig.5; column 5; lines 35-45).

With respect to claim 14, Kendall teaches that the first and second air flux directors are mounted back-to-back (Fig.5).

With respect to claim 15, Kendall teaches a second air flux director (34b) which

defines a truncated cone with a concave outer surface; a second duct; and a second fan (36b), fan blades of the first and second fans, the first and second ducts, and the first (34a) and second air flux directors (34b) being coaxial (Fig.5).

With respect to claim 16, Kendall teaches an assembly comprising: an x-ray tube (12) mounted in a housing; the cooling system (26) (column 3; lines 27-39); and a pump (an inherent part that is commonly used to move the fluid) which circulates the cooling fluid through the housing and the cooling system of claim 1 (column 3; line 50 - column 4; line 2).

With respect to claim 18, Kendall teaches a CT system (10) comprising: a gantry (12) mounted for rotation about a gantry (12) an x-ray tube (14) mounted in a housing; the cooling system (26); and a pump which circulates the cooling fluid through the housing and the cooling system supported by the gantry; and, an array (16) of x-ray detectors mounted to the gantry (12) opposite to the x-ray tube (14)

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

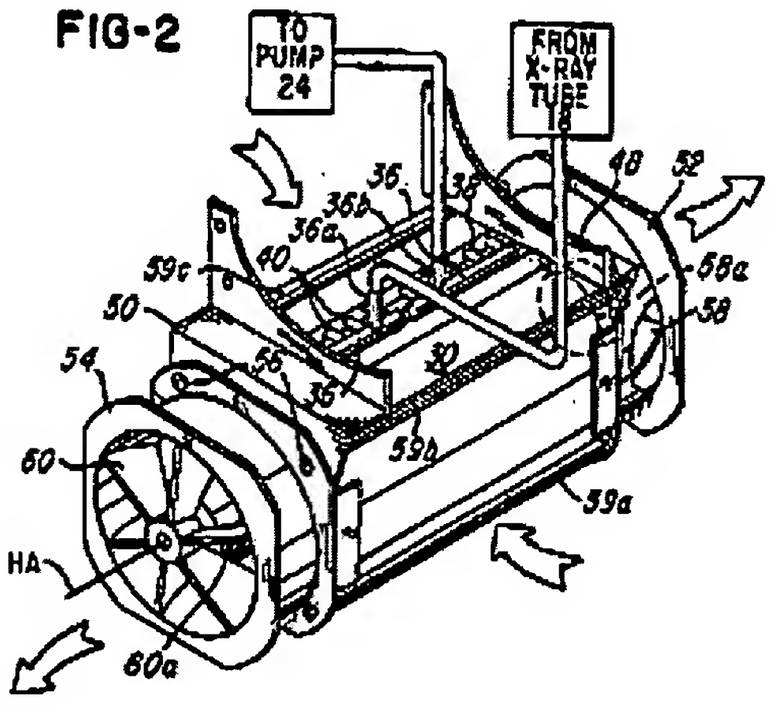
5. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kendall (US Patent 5,956,383) as applied to claim 16 above, and further in view of McCarthy, JR. (US Patent Application Publication 2004/0022362 A1).

With respect to claim 17, Kendall teaches the conventional well-known CT system with the cooling arrangement (column 3, lines 20-40) but fails to teach that the x-ray tube has a power output of at least 4.5 KW. McCarthy teaches that in a conventional well-known CT system with a cooling arrangement an x-ray tube has power input in order of 1 KW to about 10 KW (see paragraph 0005). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the x-ray tube having the power output at least 4.5 KW as suggested by McCarthy in the apparatus of Kendall in order to generate sufficient X-rays to provide the X-ray CT examination and generate sufficient heat to justify having the cooling system.

6. Claims 1-12, 16 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCarty, Jr. (US Patent 6,997,609 B2) in view of Rodewald (US Patent 4,634,342).

With respect to claims 1, 19 and 20, McCarthy teaches

FIG-2

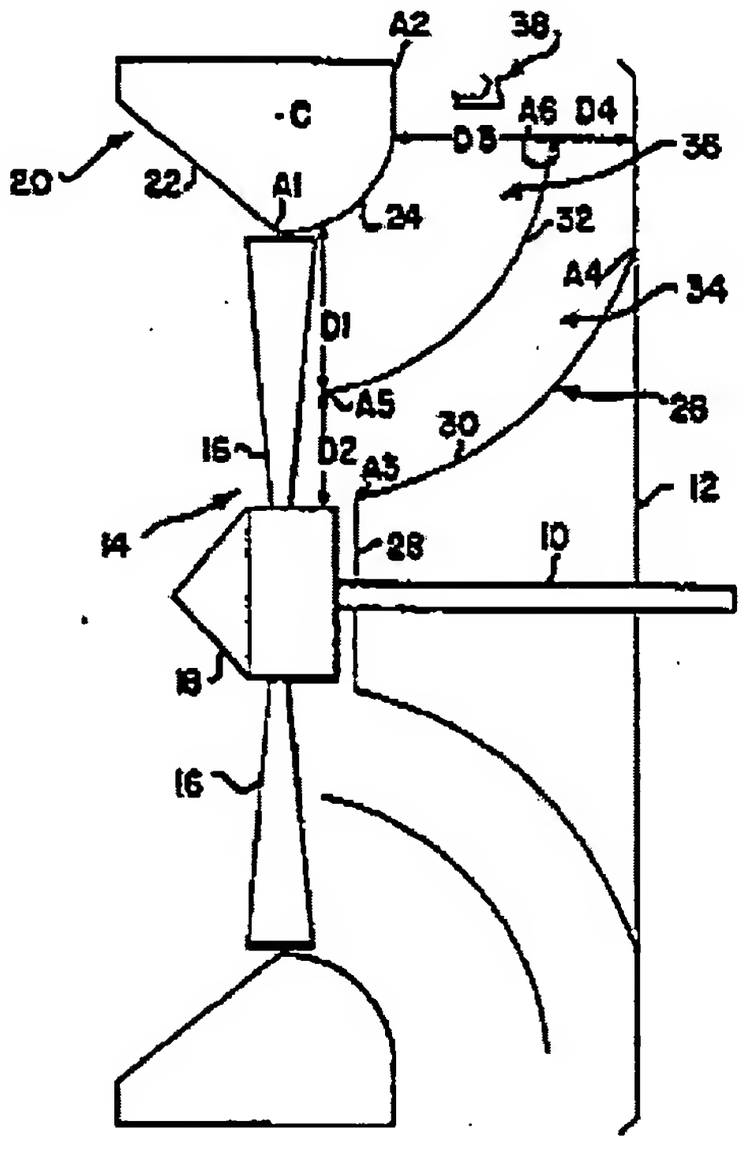


a cooling system and method for use with an

associated x-ray tube assembly (Figs. 1-4) comprising:

a heat exchanger (30) which receives cooling fluid from a housing of the associated x-ray tube assembly and transfers heat between the cooling fluid and a flow of air (Figs. 2-4; column 4; lines 6-19); a fan (60) disposed to move the flow of air through the heat exchanger (column 4; lines 38-45). McCarthy fails to teach an air flux director positioned to intercept the flow of air from the heat exchanger and to redirect the flow of air in a direction that is generally perpendicular to an axis of rotation of the fan (HA) (see Fig.2).

Rodewald teaches a fan (14) (column 2; lines 19-24) comprising:



air flux director (26) positioned to intercept the flow of air and redirect the flow of air in a direction that is generally perpendicular to an axis of rotation of the fan (14) (see Figure; column 2; lines 40-46) providing a

configuration which will displace as much air as possible for the consumption of the least amount of power (column 1; lines 7-11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the air flux director as suggested by Rodewald in the system and method of McCarthy, since such a modification would provide user with the improved cooling arrangement displacing as much air as possible from the heat exchanger for the consumption of the least amount of power.

With respect to claim 2, McCarthy teaches that the fan (60) is an axial fan (Fig. 2; column 4; line 43).

With respect to claim 3, Rodewald teaches that the air flux director defines a truncated cone with a concave outer surface (see Figure).

With respect to claim 4, Rodewald teaches that the air flux director (26) is spaced from the fan (14) along the rotational axis of the fan (see Figure).

With respect to claim 5, Rodewald teaches that the air flux director (26) is aligned with the rotational axis of the fan (14) (see Figure).

With respect to claim 6, Rodewald teaches that the fan (14) is positioned intermediate an intake section (22) and the air flux director (26) (see Figure).

With respect to claim 7, Rodewald teaches that the fan includes blades (16) that have a diameter, which is less than a maximum outer diameter of the air flux director (see Figure).

With respect to claim 8, Rodewald teaches that the fan (14) includes a shaft (10) associated with a motor director and being mounted to the air flux detector (see Figure).

With respect to claim 9, Rodewald teaches a duct (20 and 22) which receives air and diminishes in cross section toward the air flux director (26) (see Figure).

With respect to claim 10, Rodewald teaches that the fan (14) includes radial blades (16), which are positioned within the duct (20 and 22) (see Figure).

With respect to claim 11, Rodewald teaches that the air flux director (26) defines a truncated cone with a concave outer surface, the duct (22), the fan blades (16), and the air flux director (26) being coaxial (see Figure).

With respect to claim 12, Rodewald teaches that the cooling system, further including: a second heat exchanger mounted in parallel with the first heat exchanger; a second fan disposed to move a second flow of air through the second heat exchanger but fails to teach a second air flux director. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a second air flux director positioned to intercept the second flow of air from the second heat exchanger in order to redirect the second flow of air in a direction which is generally perpendicular to an axis of rotation of the second fan for improving cooling.

With respect to claim 16, McCarthy teaches an assembly comprising: an x-ray tube (18) mounted in a housing; the cooling system (10); and a pump (24), which circulates the cooling fluid through the housing, and the cooling system (Figs. 1 and 2; column 3; lines 53-61).

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Irakli Kiknadze whose telephone number is 571-272-2493. The examiner can normally be reached on 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on 571-272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

lk/April 27, 2007

Irakli Kiknadze
Patent Examiner